

AMENDMENTS TO THE CLAIMS

Please cancel claims 1, 6, 20, and 22 without prejudice or disclaimer of the underlying subject matter, and amend claims 3, 5, and 7 as set forth below:

1. (CANCELED).

2. (CANCELED).

1 ~~3.~~ (CURRENTLY AMENDED) ~~An optical element as set forth in claim~~

~~1.~~ An optical element having a substrate formed by an optical material,

said substrate comprising:

a convex part functioning as a convex lens;

a flat part positioned around said convex part; and

an outer circumference part positioned around said flat part, wherein

a thickness of said outer circumference part is greater than that of said flat

part, and greater than said convex part,

whereby the mechanical strength is improved and the resonance frequency is increased,

wherein said substrate comprises a first groove formed at a boundary between said convex part and said flat part, for defining a region of said convex part.

2 ~~4.~~ (ORIGINAL) An optical element as set forth in claim ~~3~~, wherein said substrate comprises a second groove formed at a boundary between said flat part and said outer circumference part, for defining a region of said flat part.

3 ~~5.~~ (CURRENTLY AMENDED) ~~An optical element as set forth in claim~~

~~1.~~ An optical element having a substrate formed by an optical material,

said substrate comprising:

a convex part functioning as a convex lens;

a flat part positioned around said convex part; and

an outer circumference part positioned around said flat part, wherein

a thickness of said outer circumference part is greater than that of said flat

part, and greater than said convex part,

whereby the mechanical strength is improved and the resonance frequency is increased,

wherein said optical material comprises fused silica.

6. (CANCEL).

4 7. (CURRENTLY AMENDED) ~~An optical element as set forth in claim~~
~~1. An optical element having a substrate formed by an optical material,~~

said substrate comprising:

a convex part functioning as a convex lens;

a flat part positioned around said convex part; and

an outer circumference part positioned around said flat part, wherein

a thickness of said outer circumference part is greater than that of said flat

part, and greater than said convex part,

whereby the mechanical strength is improved and the resonance frequency is
increased,

wherein a plurality of steps are formed at said outer circumference part, the thickness of said substrate at an outer side step is thicker than that of said substrate at an inner side step, and thereby eclipse is prevented.

5 8. (ORIGINAL) An optical element having a substrate formed by an optical material,

said substrate comprising:

a convex part functioning as a convex lens;

a flat part positioned around said convex part;

an outer circumference part positioned around said flat part;

a first groove formed at a boundary between said convex part and said flat part, for defining a region of said convex part; and

a second groove formed at a boundary between said flat part and said outer circumference part, for defining a region of said flat part, wherein

a thickness of said outer circumference part is greater than that of said flat part;

both said flat part and said outer circumference part comprise flat shapes in the thickness direction; and

said convex part, said flat part, and said outer circumference part are

integrated in a unit by said substrate.

6. (ORIGINAL) An optical element having a substrate formed by an optical material, said substrate comprising:

- a convex part functioning as a convex lens;
- a flat part positioned around said convex part;
- an outer circumference part positioned around said flat part; and
- a groove formed at a boundary between said convex part and said flat part, for defining a region of said convex part, wherein

- a thickness of said outer circumference part is greater than that of said convex part;

- both said flat part and said outer circumference part comprise flat shapes in the thickness direction; and

- said convex part, said flat part, and said outer circumference part are integrated in a unit by said substrate.

7. (ORIGINAL) An optical element having a substrate formed by an optical material,

- said substrate comprising:

- a convex part functioning as a convex lens;
- a flat part positioned around said convex part;
- a first outer circumference part positioned around said flat part;
- a second outer circumference part positioned around said first outer circumference part;

- a first groove formed at a boundary between said convex part and said flat part, for defining a region of said convex part; and

- a second groove formed at a boundary between said flat part and said first outer circumference part, for defining a region of said flat part, wherein

- a thickness of said first and second outer circumference parts are greater than that of said flat part and the thickness of said second outer circumference part is greater than that of said first outer circumference part;

- all said flat part and said first and second outer circumference parts comprise

flat shapes in the thickness direction; and

said convex part, said flat part, and said first and second outer circumference parts are integrated in a unit by said substrate.

11. (CANCELED).
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19. (CANCELED).
20. (CANCELED).
21. (CANCELED).
22. (CANCELED).

8 ~~23~~. (PREVIOUSLY PRESENTED) An optical pickup comprising:
an optical element functioning as an object lens when mounted on a recording and/or reproducing apparatus of an optical storage medium and
a photodetector for receiving a reflected light beam for use in recording and/or reproduction to and from the optical storage medium,
the optical element comprising a substrate formed by an optical material,
the substrate comprising
a convex part functioning as a convex lens,
a flat part positioned around the convex part, and
an outer circumference part positioned around the flat part,
a thickness of the outer circumference part being thicker than that of the flat part to thereby improve mechanical strength and increase a resonance frequency, wherein a plurality of steps are formed at said outer circumference part, the thickness of said substrate at an outer side step is greater than that of said substrate at an inner side step, and thereby eclipse is prevented.

9 ~~24~~. (PREVIOUSLY PRESENTED) An optical element having a substrate formed by an optical material, said substrate comprising:

a convex part functioning as a convex lens;
a flat part positioned around said convex part; and
an outer circumference part positioned around said flat part, wherein
a thickness of said outer circumference part is greater than that of said flat part, and wherein said substrate comprises a first groove formed at a boundary between said convex part and said flat part, for defining a region of said convex part.

10 ~~25~~. (PREVIOUSLY PRESENTED) An optical element as set forth in claim ~~24~~,⁹ wherein the thickness of said outer circumference part is greater than that of said convex part.

11 ~~26~~. (PREVIOUSLY PRESENTED) An optical element as set forth in claim ~~24~~,⁹ wherein said substrate comprises a second groove formed at a boundary between said flat part and said outer circumference part, for defining a region of said flat part.

9 12 ~~27~~. (PREVIOUSLY PRESENTED) An optical element as set forth in claim ~~24~~,⁹ wherein said optical material comprises fused silica.

13 ~~28~~. (PREVIOUSLY PRESENTED) An optical element as set forth in claim ~~24~~,⁹ wherein a surface of said outer circumference part is flat or approximately flat and thereby holding is eased.

14 ~~29~~. (PREVIOUSLY PRESENTED) An optical element as set forth in claim ~~24~~,⁹ wherein a plurality of steps are formed at said outer circumference part, the thickness of said substrate at an outer side step is thicker than that of said substrate at an inner side step, and thereby eclipse is prevented.

15 ~~30~~. (PREVIOUSLY PRESENTED) An optical element having a substrate formed by an optical material,
said substrate comprising:
a convex part functioning as a convex lens;

a flat part positioned around said convex part; and
an outer circumference part positioned around said flat part, wherein
a thickness of said outer circumference part is greater than that of said flat
part, wherein said optical material comprises fused silica.

16 ~~st.~~ (PREVIOUSLY PRESENTED) An optical element having a substrate
formed by an optical material,
said substrate comprising:
a convex part functioning as a convex lens;
a flat part positioned around said convex part; and
an outer circumference part positioned around said flat part, wherein
a thickness of said outer circumference part is greater than that of said flat
part, wherein a plurality of steps are formed at said outer circumference part, the thickness of
said substrate at an outer side step is thicker than that of said substrate at an inner side step,
and thereby eclipse is prevented.

17 ~~st.~~ (PREVIOUSLY PRESENTED) An optical element as set forth in claim
16 ~~st.~~, wherein said substrate comprises a first groove formed at a boundary between said
convex part and said flat part, for defining a region of said convex part.